

**Proposed Water Release Strategy for Cougar Reservoir
Winter Deep Drawdown
2021-11-15**

Due to recent rain events and high inflowing conditions, the Corps has allowed Cougar Reservoir to refill to ~El. 1519 ft. while maintaining exclusive regulating outlet (RO) outflows and downstream total dissolved gas (TDG) of < 110%. Another storm is forecast for later in the week, which will prevent the Corps from drawing Cougar Reservoir back down to El. 1505 ft. (+/- 5ft.) unless the Corps increases outflows now. Consequently, the Corps must decide whether to retain Cougar Reservoir at a higher reservoir elevation until after the next storm event passes or, alternatively, to increase outflows now to lower the reservoir to El. 1505 again. The following water release strategies are possible:

- (1) Draft Cougar Reservoir back to El. 1505 ft. (+/- 5ft.) by increasing RO releases and exceeding the downstream TDG water quality standard (WQS) of 110%;
- (2) Hold RO outflows steady (to avoid exceeding the TDG WQS), then discharge through the turbine units, while drafting Cougar Reservoir back down to El. 1505 ft; or,
- (3) Maintain Cougar Reservoir at a higher elevation and continue to release water through the ROs to the TDG WQS, preventing downstream TDG of greater than 110%.

Both the Corps and NMFS support an operation that draws Cougar Reservoir back down to its targeted elevation of 1505 ft. (+/- 5 ft.) while continuing to discharge water exclusively through the ROs, as this is the safer route of passage for fish. While this may increase TDG to above 110%, the agencies believe this is less harmful to Chinook life history stages present below Cougar than operating, and potentially passing juvenile Chinook through, the turbine units. Therefore, the following water release strategy is recommended during and after high flow events for the duration of the Cougar winter deep drawdown operation (Injunction Measure 14):

Operational Plan

- During and after high flow events, water should be discharged from Cougar Reservoir exclusively through the ROs up to a flow cap of 2,000 cfs (with no turbine unit operation) while allowing the reservoir elevation to rise no higher than El. 1532 ft. if possible.
 - o RO outflows should be capped at 2,000 cfs. This prescribed flow cap will ensure safe fish passage while avoiding 120% TDG for extended periods.¹
 - o If the reservoir elevation rises above El. 1532 ft., the turbines should be used in combination with the ROs to prevent Cougar Reservoir from refilling further.

¹ Reference re: timing of the harm to juveniles at 120% if longer than 30 hours:

Maule, Alec, Matthew Mesa, Karen Hans, Joseph Warren, Mary Swihart, "Gas Bubble Trauma Monitoring and Research of Juvenile Salmonids", 1995 Annual Report, Project No. 198740100, 74 electronic pages, (BPA Report DOE/BP-35245-6), available at https://digital.library.unt.edu/ark:/67531/metadc691875/m2/1/high_res_d/621867.pdf.

- However, the ROs should be used exclusively, when possible, to draw Cougar Reservoir back down to El. 1505 ft. (+/- 5ft.) after a storm event using a flow cap of 2,000 cfs.
- Depending on real-time conditions, the Corps may need to deviate from this strategy for flood risk management purposes.